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(19) **United States**(12) **Patent Application Publication**  
Hwang et al.(10) Pub. No.: **US 2002/0163952 A1**(43) Pub. Date: **Nov. 7, 2002**(54) **VCSEL WITH SINGLE  
LASING-REFLECTIVITY PEAK  
REFLECTOR****Publication Classification**(51) Int. Cl.<sup>7</sup> ..... **H01S 3/08**(52) U.S. Cl. .... **372/96**(76) Inventors: **Wen-Yen Hwang**, Sugar Land, TX  
(US); **Chih-Hsiang Lin**, Sugar Land,  
TX (US); **James N. Baillargeon**,  
Springfield, NJ (US)(57) **ABSTRACT**

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A laser apparatus has a first mirror, a second mirror, at least a portion of which is defined by the first and second mirrors. The laser has an active region located in the laser cavity, which is capable of stimulated emission at one or more wavelengths of light. The second mirror comprises a plurality of dielectric layers arranged in parallel and having a reflectivity band with a peak reflectivity at a peak wavelength, said reflectivity band having a width of less than 1 nm at a reflectivity of 3% less than the peak reflectivity. The laser apparatus may be a tunable laser apparatus in which the peak wavelength of the reflectivity band is adjusted, thereby adjusting the lasing wavelength of the laser. The reflectivity band may be a lasing threshold reflectivity band over which the reflectivity of the second mirror is greater than a lasing threshold reflectivity which is sufficient to permit lasing.

(21) Appl. No.: **10/029,059**(22) Filed: **Dec. 20, 2001****Related U.S. Application Data**

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